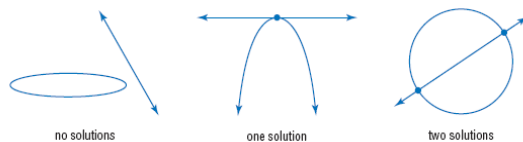


8-7 Solving Quadratic Systems

Line and quadratic

Quadratic and quadratic

SYSTEMS OF QUADRATIC EQUATIONS If the graphs of a system of equations are a conic section and a line, the system may have zero, one, or two solutions. Some of the possible situations are shown below.



If the graphs of a system of equations are two conic sections, the system may have zero, one, two, three, or four solutions. Some of the possible situations are shown below.



Solve.

$$4x^2 + y^2 = 25$$

$$2x + y = -1$$

ellipse
line

$$\begin{aligned}
 y &= -2x - 1 \\
 4x^2 + (-2x - 1)^2 &= 25 \\
 4x^2 + 4x^2 + 4x + 1 &= 25 \\
 8x^2 + 4x - 24 &= 0 \\
 4(2x^2 + x - 6) &= 0 \\
 (2x - 3)(x + 2) &= 0 \\
 x = \frac{3}{2} \quad x = -2
 \end{aligned}$$

$$y = -2x - 1$$

$$-2(-2) - 1$$

$$(-2, 3)$$

$$y = -2\left(\frac{3}{2}\right) - 1$$

$$-4$$

$$\left(\frac{3}{2}, -4\right)$$

$$y = \frac{2 \pm \sqrt{4 - 4(1)(2)}}{2}$$

No
Real
Solutions

Solve.

$$x^2 - 3y^2 = 8$$

$$x - y = 2$$

hyperbola
line

$$x = y + 2$$

$$(y+2)^2 - 3y^2 = 8$$

$$y^2 + 4y + 4 - 3y^2 = 8$$

$$-2y^2 + 4y - 4 = 0$$

$$-2(y^2 - 2y + 2) = 0$$

Solve.

$$x^2 + 2y^2 = 23$$

$$2x^2 - y^2 = 1$$

ellipse
hyperbola

$$4x^2 - y^2 = 2$$

$$5x^2 = 25$$

$$x^2 = 5$$

$$x = \pm\sqrt{5}$$

Plug in

$$\left\{ \begin{array}{l} (\sqrt{5}, 3) \\ (\sqrt{5}, -3) \\ (-\sqrt{5}, 3) \\ (-\sqrt{5}, -3) \end{array} \right\}$$

Solve.

$$x^2 + y^2 = 25 \quad \begin{matrix} C \\ h \end{matrix}$$

$$2x^2 - 3y^2 = 30 \quad \begin{matrix} C \\ h \end{matrix}$$

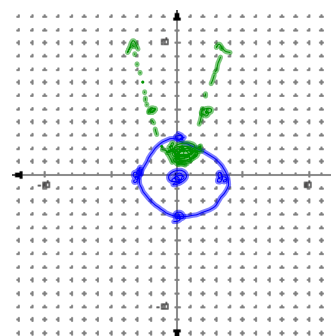
$$(\pm\sqrt{21}, \pm 2)$$

Solving systems of Inequalities.

$$\begin{matrix} C \\ P \end{matrix} \quad \begin{matrix} x^2 + y^2 \leq 9 \\ y > x^2 + 1 \end{matrix}$$

Circle
 $C(0,0)$
 $r=3$

$$\begin{array}{r} 12 \\ -12 \\ \hline 24 \\ -24 \\ \hline 0 \end{array}$$

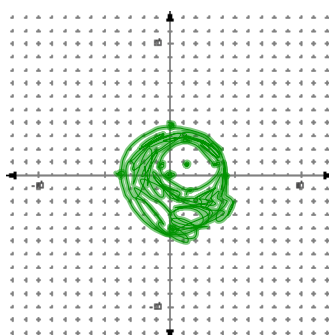


Solve.

$$x^2 + y^2 \leq 16 \quad \begin{matrix} C \\ h \end{matrix}$$

$$(x-1)^2 + (y-1)^2 \geq 4 \quad \begin{matrix} C \\ h \end{matrix}$$

$C(0,0)$ $C(1,1)$
 $r=4$ $r=2$



Olive

HW

p458-459

17, 19, 21, 24, 28, 32-34